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10/706,772	11/12/2003	Kohei Asada	7217/70980	7717

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LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK
600 SOUTH AVENUE WEST
WESTFIELD, NJ 07090

EXAMINER	
SAUNDERS JR, JOSEPH	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/706,772	ASADA ET AL.	
	Examiner	**Art Unit**	
	Joseph Saunders	2614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 June 2009.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,3 and 5-8 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,3 and 5-8 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 04 February 2008 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the communications filed June 29, 2009.

Claims 1, 3, and 5 – 8 are currently pending and considered below.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, and 5 – 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bienek et al. (WO 02/078388 A2), hereinafter Bienek, in view of Foster et al. (US 5,815,578), hereinafter Foster.

Claim 1: Bienek discloses a method of reproducing an audio signal (method and apparatus to create a sound field), comprising the steps of: supplying an audio signal (input signal 101) to a plurality of digital filters (delay means 1508 or adjustable digital filter 1512 can also be arranged to apply delays), and producing a respective plurality of filtered signals; generating a sound field inside a closed space by supplying the plurality of filtered signals from the plurality of digital filters to a respective plurality of speakers constituting a speaker array (Description of Figure 6, Pages 18 – 19); and focusing reflective sounds outputted from one or more of the speakers of the speaker array to a plurality of locations each corresponding to a respective listener ,

“Figure 20 illustrates the use of a single DPAA and **multiple reflecting or resonating surfaces (2102)** to present multiple sources to **listeners (2103)**. As it does not rely on psychoacoustic cues, the surround sound effect is audible throughout the listening area.

The sound beams may be unfocussed, as described above with reference to Figures 7A or 7B, or focussed, as described above with reference to Figure 7C. The focus position can be chosen to be either in front of, at, or behind the respective reflector/resonator to achieve the desired effect. Figure 21 schematically shows the effect achieved when a sound beam is focussed in front of and behind a reflector respectively. The DPAA (3301) is operable to direct sound towards the reflectors (3302 & 3303) set up in a room (3304).

In the case when a sound beam is focussed in front of a reflector (3302) at **a point F1** (See Figure 21), the beam narrows at the focus point and spreads out thereafter. The beam continues to spread after reflection from reflector and **a listener at position P1 will hear the sound**. Due to the reflection, the user will perceive the sound as emanating from the ghost **focal point F1'**. Thus the listener at P1 will perceive the sound as emanating from outside the room (3304). **Further, the beam obtained is quite broad so that a large proportion of listeners in the bottom half of the room (3304) will hear the sound.**

In the case when a sound beam is focussed behind a reflector (3303) at **a point F2** (See Figure 21), the beam is reflected before it has fully narrowed to the focus point. After reflection, the beam spreads out and **a listener at position P2 will be able hear the sound**. Due to the reflection, the user will perceive the sound as emanating from the reflected **focal point F2'** in front of the reflector. Thus the listener at P1 will perceive the sound as emanating from close by. **Further, the beam obtained is quite narrow so that it is possible to direct sound to a smaller proportion of the listeners in the room.** Thus, it can be advantageous for the above reasons to focus the beams at positions other than the reflector/resonator.

Where the DPAA is operated in the manner previously described with multiple separated beams--ie. with sound signals representative of distinct input signals directed to distinct and separated regions--in non-anechoic conditions (such as in a normal room environment) wherein there are multiple hard and/or predominantly sound reflecting boundary surfaces, and in particular where those regions are directed at one or more of the reflecting boundary surfaces, then using only his normal directional sound perceptions an observer is easily able to perceive the separate sound fields, and simultaneously locate each of them in space at their respective **separate focal regions** (if there is one), **due to the**

reflected sounds (from the boundaries) reaching the observer from those regions," Page 32 – 34,

inside a sound field after being reflected by a wall surface of the closed space with a sound pressure greater than a sound pressure at a peripheral location in the closed space,

"If the signal delay applied by the signal delay means (1508) and/or the adaptive digital filter (1512) is chosen such that the sum of the delay plus the sound travel time from that SET (104) to a chosen point in space in front of the DPAA are for all of the SETs the same value - ie. so that sound waves arrive from each of the output transducers at the chosen point as in-phase sounds - then **the DPAA may be caused to <u>focus</u> sound at that point, P**. This is illustrated in Figure 7C.

As can be seen from Figure 7C, the delays applied at each of the output transducers (104a through 104h) again increase, although this time not linearly. **This causes a curved wave front F which converges on the focus point such that the sound intensity at and around the focus point (in a region of dimensions roughly equal to a wavelength of each of the spectral components of the sound) is considerably higher than at other points nearby**," Third Sound Field, Pages 21 – 22 and Figure 7C.

"The first aspect of the invention relates to the use of a DPAA in a multichannel system. As already described, different channels

may be <u>directed in different directions</u> using the same array to provide special effects. Figure 8 schematically shows this in plan view the array (3801) is used to direct a first beam of sound (B1) substantially straight ahead towards a listener (X). This can be either focussed or not as shown in Figures 7A or 7B. **A second beam (B2) is <u>directed</u> at a slight angle, so that the beam passes by the listener (X) and undergoes <u>multiple reflections from the walls</u> (3802), <u>eventually reaching the listener</u> again. A third beam (B3) is <u>directed</u> at a stronger angle so that it <u>bounces once of the side wall</u> and <u>reaches the listener</u>.** A typical application for such a system is a home cinema system in which beam B1 represents a centre sound channel, beam B2 represents a right surround (right rear speaker in conventional systems) sound channel and beam B3 represents a left sound channel. Further beams for the right channel and left surround channel may also be present but are omitted from Figure 8 for clarity. As is evident, the beams travel different distances before reaching the user. For example, the centre beam may travel 4.8m, the left and right channels may travel 7.8m and the surround channels travel 12.4m. To account for this, an extra delay can be applied to the channels which travel the shortest distance so that each channel reaches the user substantially simultaneously," Page 24 Description of Figure 8.

It is noted that Figure 7C referenced above also illustrates focusing or directing sound as shown in Figure 7B and is also disclosed as achieving the first aspect of the present invention. Therefore Bienek clearly anticipates focusing sounds outputted from the plurality of speakers to a location of a listener inside a sound field after being reflected by a wall surface.

While Bienek further discloses said plurality of digital filters being defined such that the reflective sounds are focused at the location of the listener (Again Figure 7C and Figure 8) Bienek does not disclose that a sound pressure reduced point of direct sounds outputted from one or more of the speakers of the speaker array is at the location of the listener.

Bienek does disclose reducing “side lobes” of the sound beams by providing a window function to improve directivity. Foster teaches another method that does better than just reducing “side lobes” or “leakage” it cancels “leakage”. Foster teaches “In one embodiment, the present invention provides a leakage canceling signal which cancels the surround sound leakage signal in the vicinity of listener 100 so that the perception of listener 100 that the surround sound signal is emanating from reflecting surfaces is improved. For the surround sound leakage signal, a leakage canceling signal is generated in the vicinity of the listener by applying a leakage transmission signal to a direct speaker. The leakage canceling signal effectively suppresses the surround sound leakage signal so that it does not disturb the listener's perception. The leakage transmission signal is derived as described below from a measured transfer function which describes the transmission and propagation of the surround sound leakage signal

to the vicinity of the listener and the transfer function which describes the transmission and propagation of a direct signal to the listener," Column 5 Lines 22 – 36 see also Figure 3 and Column 8 Lines 18 – 57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the transfer function, as taught by Foster, of the adjustable digital filters as disclosed by Bienek, thereby improving the directionality of the surround signal in the system of Bienek.

Claim 3: Bienek discloses an apparatus for reproducing an audio signal (method and apparatus to create a sound field), comprising: a plurality of speakers (output transducer 104) constituting a speaker array (array 105); and a plurality of digital filters (delay means 1508 or adjustable digital filter 1512 can also be arranged to apply delays) to which an audio signal (input signal 101) is supplied for producing a plurality of filtered signals, wherein a sound field is generated inside a closed space by supplying the plurality of filtered signals from said plurality of digital filters to said plurality of speakers, respectively (Description of Figure 6, Pages 18 – 19); and wherein reflective sounds outputted from one or more of the speakers of the speaker array are focused at a plurality of locations each corresponding to a respective listener ,

> "Figure 20 illustrates the use of a single DPAA and **multiple reflecting or resonating surfaces (2102)** to present multiple sources to **listeners (2103)**. As it does not rely on psychoacoustic cues, the surround sound effect is audible throughout the listening area.

The sound beams may be unfocussed, as described above with reference to Figures 7A or 7B, or focussed, as described above with reference to Figure 7C. The focus position can be chosen to be either in front of, at, or behind the respective reflector/resonator to achieve the desired effect. Figure 21 schematically shows the effect achieved when a sound beam is focussed in front of and behind a reflector respectively. The DPAA (3301) is operable to direct sound towards the reflectors (3302 & 3303) set up in a room (3304).

In the case when a sound beam is focussed in front of a reflector (3302) at **a point F1** (See Figure 21), the beam narrows at the focus point and spreads out thereafter. The beam continues to spread after reflection from reflector and **a listener at position P1 will hear the sound**. Due to the reflection, the user will perceive the sound as emanating from the ghost **focal point F1'**. Thus the listener at P1 will perceive the sound as emanating from outside the room (3304). **Further, the beam obtained is quite broad so that a large proportion of listeners in the bottom half of the room (3304) will hear the sound.**

In the case when a sound beam is focussed behind a reflector (3303) at **a point F2** (See Figure 21), the beam is reflected before it has fully narrowed to the focus point. After reflection, the beam spreads out and **a listener at position P2 will be able hear the sound**. Due to the reflection, the user will perceive the sound as emanating from the reflected

> **focal point F2'** in front of the reflector. Thus the listener at P1 will perceive the sound as emanating from close by. **Further, the beam obtained is quite narrow so that it is possible to direct sound to a smaller proportion of the listeners in the room.** Thus, it can be advantageous for the above reasons to focus the beams at positions other than the reflector/resonator.
>
> Where the DPAA is operated in the manner previously described with multiple separated beams--ie. with sound signals representative of distinct input signals directed to distinct and separated regions--in non-anechoic conditions (such as in a normal room environment) wherein there are multiple hard and/or predominantly sound reflecting boundary surfaces, and in particular where those regions are directed at one or more of the reflecting boundary surfaces, then using only his normal directional sound perceptions an observer is easily able to perceive the separate sound fields, and simultaneously locate each of them in space at their respective **separate focal regions** (if there is one), **due to the reflected sounds** (from the boundaries) reaching the observer from those regions," Page 32 – 34,

inside the sound field after being reflected by a wall surface of the closed space with a sound pressure greater than a sound pressure at a peripheral location,

> "If the signal delay applied by the signal delay means (1508) and/or the adaptive digital filter (1512) is chosen such that the sum of the delay

plus the sound travel time from that SET (104) to a chosen point in space in front of the DPAA are for all of the SETs the same value - ie. so that sound waves arrive from each of the output transducers at the chosen point as in-phase sounds - then **the DPAA may be caused to <u>focus</u> sound at that point, P**. This is illustrated in Figure 7C.

As can be seen from Figure 7C, the delays applied at each of the output transducers (104a through 104h) again increase, although this time not linearly. **This causes a curved wave front F which converges on the focus point such that the sound intensity at and around the focus point (in a region of dimensions roughly equal to a wavelength of each of the spectral components of the sound) is considerably higher than at other points nearby**," Third Sound Field, Pages 21 – 22 and Figure 7C.

"**The first aspect of the invention relates to the use of a DPAA in a multichannel system. As already described, different channels may be <u>directed in different directions</u> using the same array to provide special effects.** Figure 8 schematically shows this in plan view the array (3801) is used to direct a first beam of sound (B1) substantially straight ahead towards a listener (X). This can be either focussed or not as shown in Figures 7A or 7B. **A second beam (B2) is <u>directed</u> at a slight angle, so that the beam passes by the listener (X) and undergoes <u>multiple reflections from the walls</u> (3802), <u>eventually</u>**

> **reaching the listener again. A third beam (B3) is directed at a stronger angle so that it bounces once of the side wall and reaches the listener.** A typical application for such a system is a home cinema system in which beam B1 represents a centre sound channel, beam B2 represents a right surround (right rear speaker in conventional systems) sound channel and beam B3 represents a left sound channel. Further beams for the right channel and left surround channel may also be present but are omitted from Figure 8 for clarity. As is evident, the beams travel different distances before reaching the user. For example, the centre beam may travel 4.8m, the left and right channels may travel 7.8m and the surround channels travel 12.4m. To account for this, an extra delay can be applied to the channels which travel the shortest distance so that each channel reaches the user substantially simultaneously," Page 24 Description of Figure 8.

It is noted that Figure 7C referenced above also illustrates focusing or directing sound as shown in Figure 7B and is also disclosed as achieving the first aspect of the present invention. Therefore Bienek clearly anticipates focusing sounds outputted from the plurality of speakers to a location of a listener inside a sound field after being reflected by a wall surface.

While Bienek further discloses said plurality of digital filters being defined such that the reflective sounds are focused at the location of the listener (Again Figure 7C and Figure 8) Bienek does not disclose that a sound pressure reduced point of direct

sounds outputted from one or more of the speakers of the speaker array is at the location of the listener.

Bienek does disclose reducing “side lobes” of the sound beams by providing a window function to improve directivity. Foster teaches another method that does better than just reducing “side lobes” or “leakage” it cancels “leakage”. Foster teaches “In one embodiment, the present invention provides a leakage canceling signal which cancels the surround sound leakage signal in the vicinity of listener 100 so that the perception of listener 100 that the surround sound signal is emanating from reflecting surfaces is improved. For the surround sound leakage signal, a leakage canceling signal is generated in the vicinity of the listener by applying a leakage transmission signal to a direct speaker. The leakage canceling signal effectively suppresses the surround sound leakage signal so that it does not disturb the listener's perception. The leakage transmission signal is derived as described below from a measured transfer function which describes the transmission and propagation of the surround sound leakage signal to the vicinity of the listener and the transfer function which describes the transmission and propagation of a direct signal to the listener,” Column 5 Lines 22 – 36 see also Figure 3 and Column 8 Lines 18 – 57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the transfer function, as taught by Foster, of the adjustable digital filters as disclosed by Bienek, thereby improving the directionality of the surround signal in the system of Bienek.

Claim 5: Bienek discloses an apparatus for reproducing an audio signal in a desired space (method and apparatus to create a sound field), said apparatus comprising:

a plurality of speakers (output transducer 104) constituting a speaker array (array 105); and a plurality of digital filters (delay means 1508 or adjustable digital filter 1512 can also be arranged to apply delays) coupled directly or indirectly to a source (input signal 101) and respectively to said plurality of speakers, said plurality of digital filters having filter coefficients associated therewith ("It is noted that the ADFs can be arranged to apply delays to the signal by appropriate choice of filter coefficients," page 12 lines 3 – 4), said plurality of digital filters being operable to receive an audio signal from said source and to produce therefrom a plurality of filtered signals and to supply said plurality of filtered signals or signals corresponding thereto to said plurality of speakers so as to cause a sound field to be generated therefrom in the desired space (Description of Figure 6, Pages 18 – 19), and said filter coefficients having values such that reflective sounds outputted from one or more of the speakers of the speaker array are focused at a plurality of locations each corresponding to a respective listener ,

> "Figure 20 illustrates the use of a single DPAA and **multiple reflecting or resonating surfaces (2102)** to present multiple sources to **listeners (2103)**. As it does not rely on psychoacoustic cues, the surround sound effect is audible throughout the listening area.
>
> The sound beams may be unfocussed, as described above with reference to Figures 7A or 7B, or focussed, as described above with reference to Figure 7C. The focus position can be chosen to be either in

front of, at, or behind the respective reflector/resonator to achieve the desired effect. Figure 21 schematically shows the effect achieved when a sound beam is focussed in front of and behind a reflector respectively. The DPAA (3301) is operable to direct sound towards the reflectors (3302 & 3303) set up in a room (3304).

In the case when a sound beam is focussed in front of a reflector (3302) at **a point F1** (See Figure 21), the beam narrows at the focus point and spreads out thereafter. The beam continues to spread after reflection from reflector and **a listener at position P1 will hear the sound**. Due to the reflection, the user will perceive the sound as emanating from the ghost **focal point F1'**. Thus the listener at P1 will perceive the sound as emanating from outside the room (3304). **Further, the beam obtained is quite broad so that a large proportion of listeners in the bottom half of the room (3304) will hear the sound.**

In the case when a sound beam is focussed behind a reflector (3303) at **a point F2** (See Figure 21), the beam is reflected before it has fully narrowed to the focus point. After reflection, the beam spreads out and **a listener at position P2 will be able hear the sound**. Due to the reflection, the user will perceive the sound as emanating from the reflected **focal point F2'** in front of the reflector. Thus the listener at P1 will perceive the sound as emanating from close by. **Further, the beam obtained is quite narrow so that it is possible to direct sound to a**

> **smaller proportion of the listeners in the room.** Thus, it can be advantageous for the above reasons to focus the beams at positions other than the reflector/resonator.
>
> Where the DPAA is operated in the manner previously described with multiple separated beams--ie. with sound signals representative of distinct input signals directed to distinct and separated regions--in non-anechoic conditions (such as in a normal room environment) wherein there are multiple hard and/or predominantly sound reflecting boundary surfaces, and in particular where those regions are directed at one or more of the reflecting boundary surfaces, then using only his normal directional sound perceptions an observer is easily able to perceive the separate sound fields, and simultaneously locate each of them in space at their respective **separate focal regions** (if there is one), **due to the reflected sounds** (from the boundaries) reaching the observer from those regions," Page 32 – 34,

inside the desired space after being reflected by a wall surface of the desired space with a sound pressure greater than a sound pressure at a peripheral location,

> "If the signal delay applied by the signal delay means (1508) and/or the adaptive digital filter (1512) is chosen such that the sum of the delay plus the sound travel time from that SET (104) to a chosen point in space in front of the DPAA are for all of the SETs the same value - ie. so that sound waves arrive from each of the output transducers at the chosen

point as in-phase sounds - then **the DPAA may be caused to <u>focus</u> sound at that point, P**. This is illustrated in Figure 7C.

As can be seen from Figure 7C, the delays applied at each of the output transducers (104a through 104h) again increase, although this time not linearly. **This causes a curved wave front F which converges on the focus point such that the sound intensity at and around the focus point (in a region of dimensions roughly equal to a wavelength of each of the spectral components of the sound) is considerably higher than at other points nearby**," Third Sound Field, Pages 21 – 22 and Figure 7C.

"**The first aspect of the invention relates to the use of a DPAA in a multichannel system. As already described, different channels may be <u>directed in different directions</u> using the same array to provide special effects.** Figure 8 schematically shows this in plan view the array (3801) is used to direct a first beam of sound (B1) substantially straight ahead towards a listener (X). This can be either focussed or not as shown in Figures 7A or 7B. **A second beam (B2) is <u>directed</u> at a slight angle, so that the beam passes by the listener (X) and undergoes <u>multiple reflections from the walls</u> (3802), <u>eventually reaching the listener</u> again. A third beam (B3) is <u>directed</u> at a stronger angle so that it <u>bounces once of the side wall</u> and <u>reaches the listener</u>.** A typical application for such a system is a home cinema

> system in which beam B1 represents a centre sound channel, beam B2 represents a right surround (right rear speaker in conventional systems) sound channel and beam B3 represents a left sound channel. Further beams for the right channel and left surround channel may also be present but are omitted from Figure 8 for clarity. As is evident, the beams travel different distances before reaching the user. For example, the centre beam may travel 4.8m, the left and right channels may travel 7.8m and the surround channels travel 12.4m. To account for this, an extra delay can be applied to the channels which travel the shortest distance so that each channel reaches the user substantially simultaneously," Page 24 Description of Figure 8.

It is noted that Figure 7C referenced above also illustrates focusing or directing sound as shown in Figure 7B and is also disclosed as achieving the first aspect of the present invention. Therefore Bienek clearly anticipates focusing sounds outputted from the plurality of speakers to a location of a listener inside a sound field after being reflected by a wall surface.

Bienek does not disclose that a sound pressure reduced point of direct sounds outputted from one or more of the speakers of the speaker array is at the location of the listener.

Bienek does disclose reducing "side lobes" of the sound beams by providing a window function to improve directivity. Foster teaches another method that does better than just reducing "side lobes" or "leakage" it cancels "leakage". Foster teaches "In one

embodiment, the present invention provides a leakage canceling signal which cancels the surround sound leakage signal in the vicinity of listener 100 so that the perception of listener 100 that the surround sound signal is emanating from reflecting surfaces is improved. For the surround sound leakage signal, a leakage canceling signal is generated in the vicinity of the listener by applying a leakage transmission signal to a direct speaker. The leakage canceling signal effectively suppresses the surround sound leakage signal so that it does not disturb the listener's perception. The leakage transmission signal is derived as described below from a measured transfer function which describes the transmission and propagation of the surround sound leakage signal to the vicinity of the listener and the transfer function which describes the transmission and propagation of a direct signal to the listener," Column 5 Lines 22 – 36 see also Figure 3 and Column 8 Lines 18 – 57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the transfer function, as taught by Foster, of the adjustable digital filters as disclosed by Bienek, thereby improving the directionality of the surround signal in the system of Bienek.

Claim 6: Bienek and Foster disclose the method according to claim 1, and Bienek further discloses determining,

> "The seventh aspect of the invention addresses the problem that a user of the DPAA system may not always be easily able to locate where sound of a particular channel is being directed or focussed at any

particular time. Conversely, the user may want to direct or focus sound at a particular position in space which requires a complex calculation as to the correct delays to apply etc. This problem is alleviated by providing a video camera means which can be caused to point in a particular direction. Means connected to the video camera can then be used to calculate which direction the camera is pointing in and adjust the delays accordingly. Advantageously, the camera is under the direct control of the operator (for example on a tripod or using a joystick) and the DPAA controller is arranged to cause sound channel directing to occur wherever the operator causes the camera to point. This provides a very easy to set up system which does not rely on creating mathematical models of the room or other complex calculations.

Advantageously, means may be provided to detect where in the room the camera is focussed. Then, the sound beams can be focussed on the same spot. This makes setting up a system very simple since markers can be placed in a room where sound is desired to be focussed and then a camera lens can be focussed on these markers by an operator looking at a television monitor. The system can then automatically set up the software to calculate the correct delays for focussing sound to that spot. Alternatively, reference points in the room can be identified to select sound focussing. For example, a simple model of the room can be pre-programmed so that an operator can select objects in the field of view of

> the camera so determine the focussing distance. In both the case when the camera focus distance is used and when a room model is used, it is advantageous to employ a coordinate transform from camera (pan, tilt, distance) or room (x,y,z) to speaker (rotation, elevation, distance), where the two coordinate systems have different origins," Page 35 Seventh Aspect of the Invention,

a number of focal points (F1, F1', F2, F2', Figure 21) corresponding to the plurality of locations and positions thereof inside the sound field (P1, P2, Figure 21).

Claim 7: Bienek and Foster disclose the apparatus according to claim 3, and Bienek further discloses a device to determine,

> "The seventh aspect of the invention addresses the problem that a user of the DPAA system may not always be easily able to locate where sound of a particular channel is being directed or focussed at any particular time. Conversely, the user may want to direct or focus sound at a particular position in space which requires a complex calculation as to the correct delays to apply etc. This problem is alleviated by providing a video camera means which can be caused to point in a particular direction. Means connected to the video camera can then be used to calculate which direction the camera is pointing in and adjust the delays accordingly. Advantageously, the camera is under the direct control of the operator (for example on a tripod or using a joystick) and the DPAA

controller is arranged to cause sound channel directing to occur wherever the operator causes the camera to point. This provides a very easy to set up system which does not rely on creating mathematical models of the room or other complex calculations.

Advantageously, means may be provided to detect where in the room the camera is focussed. Then, the sound beams can be focussed on the same spot. This makes setting up a system very simple since markers can be placed in a room where sound is desired to be focussed and then a camera lens can be focussed on these markers by an operator looking at a television monitor. The system can then automatically set up the software to calculate the correct delays for focussing sound to that spot. Alternatively, reference points in the room can be identified to select sound focussing. For example, a simple model of the room can be pre-programmed so that an operator can select objects in the field of view of the camera so determine the focussing distance. In both the case when the camera focus distance is used and when a room model is used, it is advantageous to employ a coordinate transform from camera (pan, tilt, distance) or room (x,y,z) to speaker (rotation, elevation, distance), where the two coordinate systems have different origins," Page 35 Seventh Aspect of the Invention,

a number of focal points (F1, F1', F2, F2', Figure 21) corresponding to the plurality of locations and positions thereof inside the sound field (P1, P2, Figure 21).

Claim 8: Bienek and Foster disclose the apparatus according to claim 5, and Bienek further discloses a device to determine,

> "The seventh aspect of the invention addresses the problem that a user of the DPAA system may not always be easily able to locate where sound of a particular channel is being directed or focussed at any particular time. Conversely, the user may want to direct or focus sound at a particular position in space which requires a complex calculation as to the correct delays to apply etc. This problem is alleviated by providing a video camera means which can be caused to point in a particular direction. Means connected to the video camera can then be used to calculate which direction the camera is pointing in and adjust the delays accordingly. Advantageously, the camera is under the direct control of the operator (for example on a tripod or using a joystick) and the DPAA controller is arranged to cause sound channel directing to occur wherever the operator causes the camera to point. This provides a very easy to set up system which does not rely on creating mathematical models of the room or other complex calculations.
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a number of focal points (F1, F1', F2, F2', Figure 21) corresponding to the plurality of locations and positions thereof inside the sound field (P1, P2, Figure 21).

Response to Arguments

4. Applicant's arguments with respect to claims 1, 3, and 5 under 35 U.S.C. 103(a) have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Saunders whose telephone number is (571) 270-1063. The examiner can normally be reached on Monday - Thursday, 9:00 a.m. - 4:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis Kuntz can be reached on (571) 272-7499. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. S./
Examiner, Art Unit 2614

/CURTIS KUNTZ/

Supervisory Patent Examiner, Art Unit 2614